

REFERENCES FOR CESIUM THERAPY

1. The effect of cesium therapy on various cancers is reported. A total of 50 patients were treated over a 3 year period with CsCl. The majority of the patients have been unresponsive to previous maximal modalities of cancer treatment and were considered terminal cases. The Cs-treatment consisted of CsCl in addition to some vitamins, minerals, chelating impressive 50% recovery of various cancers, i.e., cancer of unknown primary, breast, colon, prostate, pancreas, lung, liver, lymphoma, ewing sarcoma of the pelvis and adeno-cancer of the gallbladder, by the Cs-therapy employed. There was a 26% and 24% death within the initial 2 weeks and 12 months of treatment, respectively. A consistent finding in these patients was the disappearance of pain within the initial 3 days of Cs-treatment. The small number of autopsies made showed the absence of cancer cells in most cases and the clinical impression indicates a remarkably successful outcome of treatment.

H. E. Sartori, Cesium therapy in cancer patients, Pharmacology Biochemistry and Behavior, Volume 21, Supplement 1, 1984, Pages 11-13

2. The effect of pretreatment with CsCl on mice bearing sarcoma I implants was studied as a function of duration of treatment period, life span and tissue Cs⁺ and K⁺ levels. Treatment with CsCl for 14 consecutive days prior to sarcoma implantation resulted in initial reduction of the tumor-mediated mortality compared to controls and to a one week pretreatment period with identical doses of CsCl. A large accumulation of endogenous K⁺ was noted in tumor mass compared to nonmalignant tissue of the same animals or to tumor-free controls receiving identical Cs-treatment. The entry of exogenously administered Cs⁺ into malignant tissue was less than that accumulating in respective controls. The accumulation of Cs⁺ in tumor mass was dose-dependent. The ratio of K⁺: Cs⁺ was greater in tumor tissue than in nonmalignant tissue. The results that a critical balance between these alkali metals may be required for adequate Cs effect against the tumor studied.

F. S. Messihab, Biochemical aspects of cesium administration in tumor-bearing mice, Pharmacology Biochemistry and Behavior, Volume 21, Supplement 1, 1984, Pages 27-30.

3. The effect of separate and combined administration of 15% ethanol and 0.2% CsCl solution on life span of rats with Novikoff hepatoma implants was studied as a function of time of initiation of treatment. Pretreatment with CsCl alone or combined with ethanol resulted in earlier onset on morbidity compared to the ethanol-treatment or to controls. As high as 87.5% of Cs-treated animals died 16 days post tumor implantation compared to 33% of rats receiving CsCl and ethanol combined. This protective action of ethanol against Cs-evoked toxicity in tumor-bearing rats persisted through the experiment. Animals subjected to drug treatment immediately after tumor transplantation displayed delayed onset of morbidity compared to drug pretreated rats. In both cases the Cs-treatment enhanced morbidity by approximately 2 folds from corresponding controls. Animals sacrificed 18 days post tumor inoculation showed an induction of hepatic alcohol

dehydrogenase and an increase in V_{\max} without changes in the apparent K_m by the Cs-treatment. There was an increase in liver mitochondrial aldehyde dehydrogenase of hepatoma-bearing rats from tumor-free controls which was associated with an increase in the apparent K_m value. The results indicate potentiation of the hepatoma toxicity by CsCl which may be minimized by ethanol. A role for hepatic enzymes determined in the pathogenesis of tumor line studied and/or their use as a biochemical correlate is suggested.

F. S. Messiha, Effect of cesium and ethanol on tumor bearing rats, Pharmacology Biochemistry and Behavior, Volume 21, Supplement 1, 1984, Pages 35-40.

4. The effect of CsCl on the life span of female Sprague-Dawley rats inoculated with Novikoff's hepatoma was studied as a function of both pre- and post-treatment with CsCl and as a function of the inoculant dose. The effect of KCl on the CsCl treatment was also studied. Rats treated with CsCl for 12 consecutive days prior to or immediately after inoculation with 1.0 ml of viable hepatoma cell suspension showed an increase in mortality score from corresponding controls. Conversely, increases in the dose of the inoculant resulted in delaying the onset of toxicity in rats receiving the Cs-treatment after inoculation as evidenced by a decrease in mortality. Availability of KCl in drinking water ad lib further decreased total mortality when given alone but not when combined with CsCl. The results indicate a dose-dependent paradoxical effect of CsCl on Novikoff hepatoma cell toxicity and suggest a critical intercellular balance requirement between Cs^+ and K^+ on the effect studied.

F. S. Messihab and Douglas M. Stocco, Effect of cesium and potassium salts on survival of rats bearing Novikoff hepatoma, Pharmacology Biochemistry and Behavior, Volume 21, Supplement 1, 1984, Pages 31-34.

5. The author volunteered to experience of himself the effect of short-term, i.e., 36 consecutive days, oral administration of cesium chloride. Cesium chloride was given 6 g per day into two equally divided doses. The drug was dissolved in 8 ounces fluid and consumed immediately after the morning and evening meals which were diet-restricted to wheat bran and certain grain products, to attain approximately 1% potassium intake, for the initial 3 weeks. Bread products were discontinued and yogurt and cottage cheese products were reinstated for the two week period that followed prior to reinstating of the preceding food regimens. There was an initial general feeling of well-being and heightened sense perception. A gradual decrease in appetite was noted initially before it was stabilized at a later date. Discontinuation of rich bread meals resulted in pre-nausea sensation which was followed by diarrhea 48 hr later. The institution of high potassium nutrition decreased the feeling of nausea and abolished diarrhea. A "tingling" sensation in the lip and cheek regions was experienced 15 min subsequent the cesium chloride dosage compared to same sensation occurring at moderate intensity in hands and feet at end of the experiment. No adverse effects of CsCl were noted in performance of mathematical analyses or in driving skill. It is concluded that

CsCl is devoid from toxicity provided adequate diet and supplements are administered.

Robert Neulieb, Effects of oral intake of cesium chloride: A single case report, *Pharmacology Biochemistry and Behavior*, Volume 21, Supplement 1 , 1984, Pages 15-16.

6. A brief overview on the relevance in dietary factors in both development and prevention of cancer is presented. The pharmacologic properties of various food ingredients are discussed. Establishing of a special diet for the cancer patient is suggested. In addition, avoidance of certain foods is recommended to counteract mucus production of cancer cells. Evaluation of the nutrient content of certain diets in regions with low incidence of cancer has advanced the use of certain alkali metals, i.e., rubidium and cesium, as chemotherapeutic agents. The rationale for this approach termed the "high pH" therapy resides in changing the acidic pH range of the cancer cell by cesium towards weak alkalinity in which the survival of the cancer cell is endangered, and the formation of acidic and toxic materials, normally formed in cancer cells, is neutralized and eliminated.

H. E. Sartori, Nutrients and cancer: An introduction to cesium therapy, *Pharmacology Biochemistry and Behavior*, Volume 21, Supplement 1 , 1984, Pages 7-10.

7. Cesium, a mineral resource abundantly present in Manitoba with important existing and potential industrial applications was investigated to study its effects on biological systems. Several rodent models of pharmacological activities were utilized. The profile that emerged indicated that cesium is only moderately toxic and exerts salubrious effects which could be gainfully investigated for application in the treatment of certain psychological disorders and some tumors. Its conjunction with existing pharmacological agents for these two types of disorders could yield a pharmacologically active yet less toxic therapeutic combination.

Carl Pinsky and Ranjan Bose, Pharmacological and toxicological investigations of Cesium, *Pharmacology Biochemistry and Behavior*, Volume 21, Supplement 1, 1984, Pages 17-23.

8. Mass spectrographic and isotope studies have shown that potassium, rubidium, and especially cesium are most efficiently taken up by cancer cells. This uptake was enhanced by Vitamins A and C as well as salts of zinc and selenium. The quantity of cesium taken up was sufficient to raise the cell to the 8 pH range. Where cell mitosis ceases and the life of the cell is short. Tests on mice fed cesium and rubidium showed marked shrinkage in the tumor masses within 2 weeks. In addition, the mice showed none of the side effects of cancer. Tests have been carried out on over 30 humans. In each case the tumor masses disappeared. Also all pains and effects associated with cancer disappeared within 12 to 36 hr; the more chemotherapy and morphine the patient had taken, the longer the withdrawal period. Studies of the food intake

in areas where the incidences of cancer are very low showed that it met the requirements for the high pH therapy.

A. Keith Brewer, The high pH therapy for cancer tests on mice and humans, Pharmacology Biochemistry and Behavior, Volume 21, Supplement 1 , 1984, Pages 1-5.

9. Predetermined amounts of cesium chloride or carbonate, zinc gluconate and vitamin A were used together to alter growth of colon carcinoma (C₃₈) implants in BDF₁ mice. Data show that the use of these compounds in a treatment protocol is responsible for repression of tumor growth.

Marilyn J. Tufte, Frederic W. Tufte, A. Keith Brewer, The response of colon carcinoma in mice to cesium, zinc and vitamin A, Pharmacology Biochemistry and Behavior, Volume 21, Supplement 1 , 1984, Pages 25-26.

10. This is followed by a survey of literature on cesium salts for the period between January 1981 to May 1984. The bibliography searched indicates an interesting pharmacological and behavioral effect for Cs-salts in addition to its well known physiological and itopic effects. A pattern of clinical trials suggests the potential of cesium salts in certain cancer therapies, affective disorders, tumor imaging, radiotherapy and certain cardiovascular usages. The need for continued probing into the biological activity of this alkalimetal is suggested.

F. S. Messiha, Cesium: A bibliography update, Pharmacology Biochemistry and Behavior, Volume 21, Supplement 1 , 1984, Pages 113-129.